

# Lymphocytic Choriomeningitis Virus (LCMV) Investigation: State and Local Perspectives

Presentation to:  
Epi Rapid Response Team Conference  
May 7, 2013



# LCMV

- Rodent-borne arenavirus
- Primarily transmitted by mice
  - can be transmitted by hamsters and guinea pigs
  - Estimated 5% of mice throughout the US carry LCMV



# How is LCMV transmitted to humans?

- Exposure to Infected Rodent
  - Urine
  - Droppings
  - Saliva
  - Nesting material
- Mode of transmission
  - Broken skin (bite)
  - Aerosolized or by touching
    - Nose
    - Mouth
    - Eyes



# Symptoms of LCMV

- Symptoms may vary
  - Asymptomatic
  - Fever
  - Stiff neck
  - Muscle aches
  - Headaches
  - Nausea
  - Vomiting
- Most severe cases
  - Aseptic meningitis
  - Birth defects
- Incubation Period
  - One to two weeks
- At Risk Populations
  - Pregnant
  - Immunocompromised
  - Receiving organ transplants

# LCMV Response - KY Partnership

- Centers for Disease Control and Prevention
- Kentucky Dept. for Public Health
  - Division of Epidemiology and Health Planning
  - Division of Public Health Protection and Safety
- Green River District Health Department
- Louisville-Metro Department of Health and Wellness
- US Food and Drug Administration (FDA)
- US Department of Agriculture (USDA)

# Phase I



# LCMV in Facility A

- Rodent Breeding Facility in Indiana
  - CDC notified in April 2012 about a patient diagnosed with aseptic meningitis, worked in rodent breeding facility
  - Patient tested positive for LCMV
  - After further testing, 15 of 52 (29%) employees tested positive for recent or past LCMV infection
  - Four employees were diagnosed with aseptic meningitis
  - Of the mice tested, 21% indicated LCMV infection

# Distribution of Mice from Facility A

- Quarantine of distribution in May 2012
- Live mice depopulated
- Frozen mice disposed
- Indiana Board of Animal Health partnered with CDC during investigation, testing and depopulation
- Prior to quarantine, shipped mice to Facility B for distribution
  - Mice were distributed to pet stores and breeders in 21 states **including Kentucky** via Facility B

# Kentucky Trace Forward

- **July 2012 – KY Notified of situation**
  - 3 facilities received potentially infected mice
    - Zoo
    - Reptile house
    - Pet store
  - Asked by CDC to “Trace Forward”
    - Determine disposition of mice
      - Bred, sold, comingled, fed to reptiles
      - Assess risk to humans
      - Respond to assessments



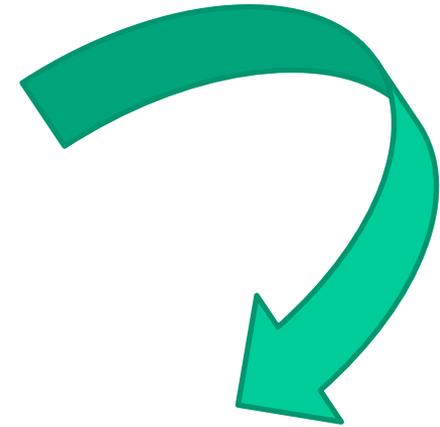
# Distribution of Mice from Facility A

- Zoo
  - Louisville-Metro HD investigated
  - Most mice already consumed
    - Remaining mice all tested negative for LCMV
  - 54 Zoo staff worked with “Feed Rodents”
    - Three pregnant staffers
    - Testing offered to pregnant women and immunocompromised
      - 2 tested - both negative
- Reptile House
  - All suspect mice consumed
  - No staff considered at risk
  - All decline testing

# Kentucky Trace Forward II

- **Pet Store**

- Louisville-Metro HD investigated
- Received tens of thousands of mice
- Sent bulk on to a separate distributor



- **Distributor**

- No electronic records – supplied handwritten list of ship-to sites
- Distributed to 52 facilities in KY and three other states
  - 30 in Kentucky
  - 18 in Indiana
  - 2 each in Tennessee and West Virginia

# Next Steps

- Notified CDC
  - Sent lists of stores in other states
  - Agreed that CDC would follow-up with these states
- Began follow-up of facilities in KY
  - Later notified of 18 more KY stores that received mice from GA distributor
- Operations Center Activated
  - LCMV
  - Massive bat exposure response
  - 8 other responses over next 3 months

# Operations Center Open



# Follow-Up with Potentially Exposed Facilities

- Mailout to pet stores

- Letter to facility explaining public health issue
- Questions and answers about LCMV
- Information on safe disposal of potentially LCMV-infected mice
- Flyer to be posted in facility “Attention Pet Owners: Caution when handling mice”



- Phone call to pet stores

- Informed facility about the public health issue
- Determined if facility needed help with depopulation
- Determined the number of at risk employees
- Answered any questions



# Attention Pet Owners: Caution When Handling Mice

Rodents, especially mice, may carry diseases such as Lymphocytic Choriomeningitis Virus (LCMV). People can get LCMV by handling and being around infected rodents. Pregnant women and persons with a weakened immune system are at greater risk of complications from LCMV.

## WHAT YOU CAN DO TO PROTECT YOURSELF

If you have a pet rodent or handle mice when feeding other animals, take the following precautions to reduce the risk of LCMV infection:

- Women who are pregnant or planning to become pregnant should avoid contact with wild or pet rodents, such as hamsters, pet mice, and guinea pigs.
- Persons with a weakened immune system should avoid contact with rodents.
- Take extra precautions when handling pet rodents and their cages and bedding.
- Always wash your hands with soap and water (and watch young children to make sure they wash their hands) after handling animals, cages, or bedding.
- Keep rodent cages clean; change the bedding often.
- Clean the cage in a well-ventilated area or outside.
- Never kiss pet rodents or hold them close to your face.
- If you use frozen rodents to feed another pet, always wear gloves when handling the rodents and wash your hands when you are done.

For more information on LCMV, visit CDC's website at:  
<http://www.cdc.gov/ncidod/dvrd/spb/mnpages/dispages/lcmv.htm>



**Kentucky Public Health**  
Prevent. Promote. Protect.

# Follow-Up with Potentially Exposed Facilities

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# Follow-Up with Potentially Exposed Facilities II

- Second phone call to pet stores
  - Call made if facility had at risk employees or needed help with depopulation
  - Local testing site information available if needed.
- Information from follow-up
  - Rodent depopulation not needed
    - No reports of live mice currently on site
    - Frozen mice on site were used for feeding
  - At risk employees
    - 12 pregnant employees (5 tested)
    - 11 immunocompromised employees (1 tested)
    - No LCMV related illness reported

# Phase II



# LCMV in Facility C

- **Investigation in Indiana reveals:**
  - Although Facility A initially reported receiving no live mice
  - Learned that indeed there had been new live mice introduced
    - For repopulation of breeding stock
    - From Facility B
    - Spring, 2012
  - Facility B indicated that they got several shipments of live mice from a breeding facility in Kentucky – Facility C
    - Usually only received frozen mice from Facility C
    - Requested shipments of live mice to help with repopulation
- **CDC asks KDPH to investigate**

# Facility C Investigation

- **KDPH contacted Green River District Health Department**
  - Regional Environmental Health Coordinators visited Facility C on July 30
  - Owner cooperative and gave investigators a tour of the facility
- **Facility C Details**
  - 5 outdoor metal buildings
    - Concrete floors
    - Solid walls and doors
    - Filtered ventilation
    - Ongoing pest control
  - 33 employees
  - One employee reportedly pregnant

# Facility C Operation

- Rodents placed in blast chiller to euthanize and freeze for distribution
- Owner reports shipping solely to Facility B in Indiana
  - Approx. 100,000-150,000/week
- Ships frozen mice almost exclusively
- **Exception:** In February and March did ship live mice to Facility B which were then shipped to Facility A
- **Testing of Rodents from Facility C found evidence of LCMV infection**

# Testing of Facility C Employees

- Owner agrees to allow testing of employees
- Green River District Health Department coordinated testing
- 32 employees tested (including owner)
  - 15 (47%) had detectable LCMV antibodies
    - 11 tests indicated recent LCMV infection
    - 4 tests indicated previous LCMV infection
  - Pregnant employee was not positive for recent or past LCMV

# Employee Interviewing – Testing

- Contacted the facility owner to schedule times for testing
- CDC provided specimen collection instructions and questionnaire.... then a 2<sup>nd</sup> questionnaire
- Combined questionnaires to streamline interviews
- District ERRT members and county health center staff used a team approach
  - 2 Nurses
  - 1 Regional Epidemiologist
  - 4 Environmental Health Specialists
  - 1 Interpreter

# Interviewing – Testing Cont.

- Just-in-time training for team members
  - Background on LCMV and facility
  - Reviewed questionnaire
  - Reviewed handouts (LCMV fact sheets)
  - Telephonic interpreter service
- Initially 30 employees requested testing
- Roughly half were non-English speaking
- Environmentalists and Regional Epi interviewed employees and then taken to a nurse for a blood draw

# Testing Follow-up

- Initial results: 12 positive for LCMV antibodies; 14 negative; 4 non-specific (retesting recommended)
- Letters including the results were mailed to each individual
- Time was scheduled at the county health center for employees that may have questions about their results
- 19 elected to come in for counseling with a nurse
- 4 with non-specific results were retested
- 2 former employees requested to be tested

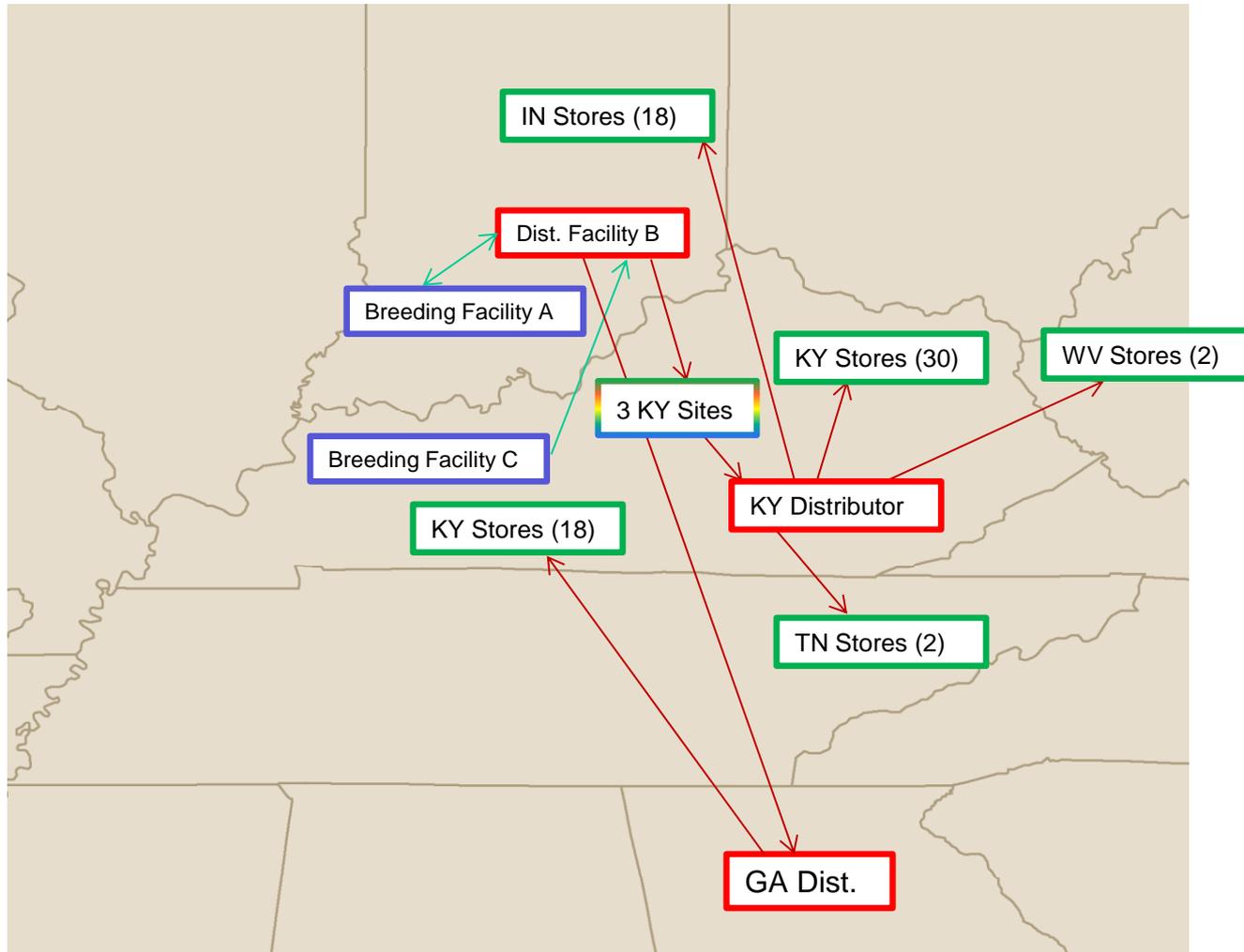
# Depopulation of Mice in Facility C

- Kentucky is one of 13 states that does not regulate the pet industry
- KDPH negotiates with USDA for depopulation
  - Not under their jurisdiction
- Feeder mice put under jurisdiction of FDA as pet food
  - FDA Equipped with proper PPE for depopulation
  - FDA assisted with depopulation
- ~ 380,000 live mice euthanized via flash freezing
- Facility C agrees to dispose of Facility B frozen product
  - Facility B sends back 5 pallets of frozen mice
- All frozen product buried on farm property (~810,000 mice)

# Depopulation of Mice in Facility C

- Owners of the facility reported that approximately 6 months prior to the outbreak wild mice had infested feed storage areas.
- Around that time litters of mice were born with black eyes (colony mice are albino). Indicates that wild mice interbred with colony mice.
- Facility reportedly stopped operating immediately after depopulation. Unclear of when they intended to resume operations
- Strict biosecurity, microbiological monitoring, and PPE use necessary to prevent future outbreaks

# Kentucky's Distribution Network



# Acknowledgements

- **KY Department for Public Health**
  - Doug Thoroughman, PhD, MS
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  - John Poe, DVM, MPH
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  - Elizabeth Russell, PhD
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  - Jessica Austin, MPH
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  - Sandra Melendez, RN, BSN
- **Centers for Disease Control and Prevention**
  - Barbara Knust, DVM, MPH
  - Laura Edison

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